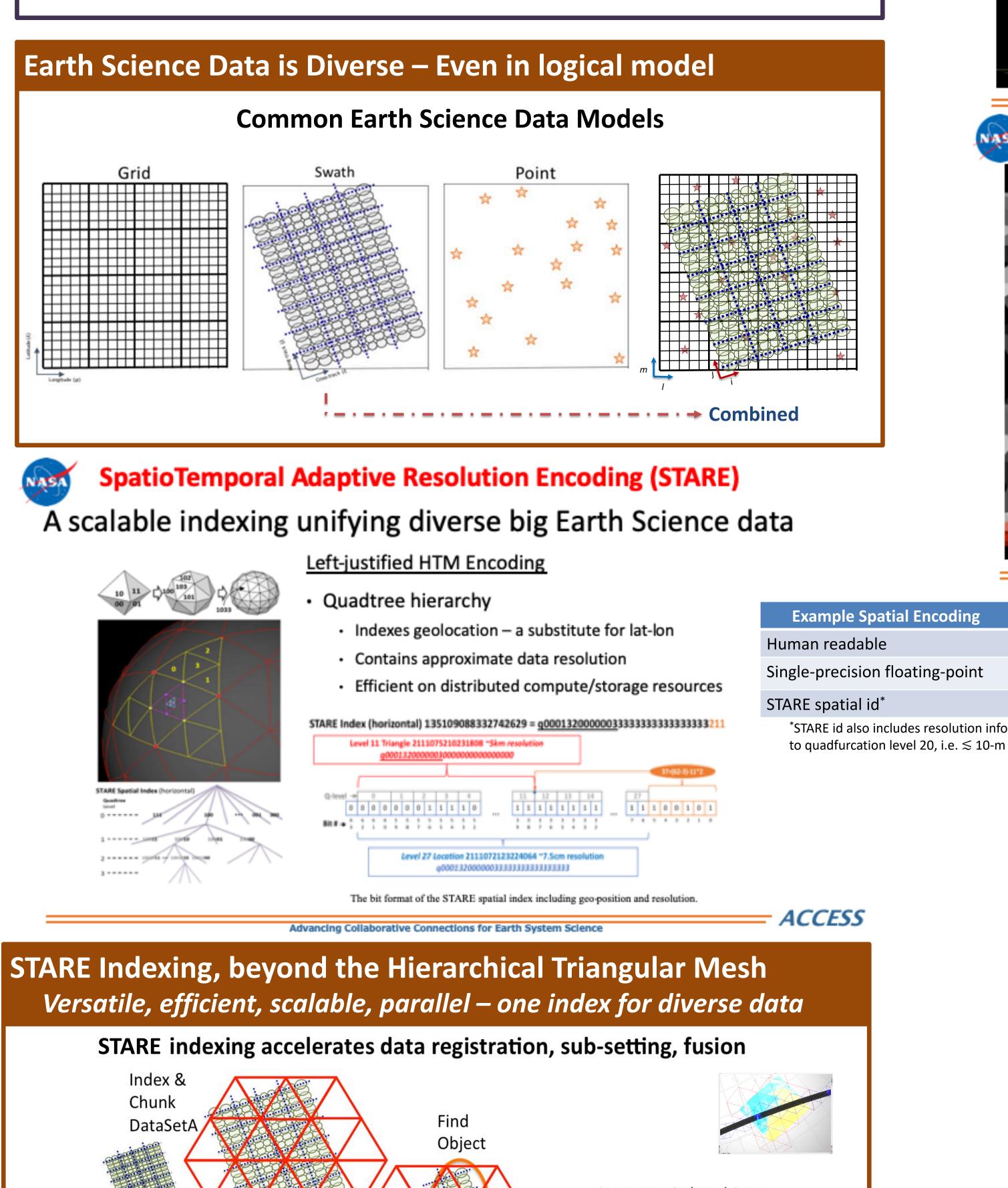


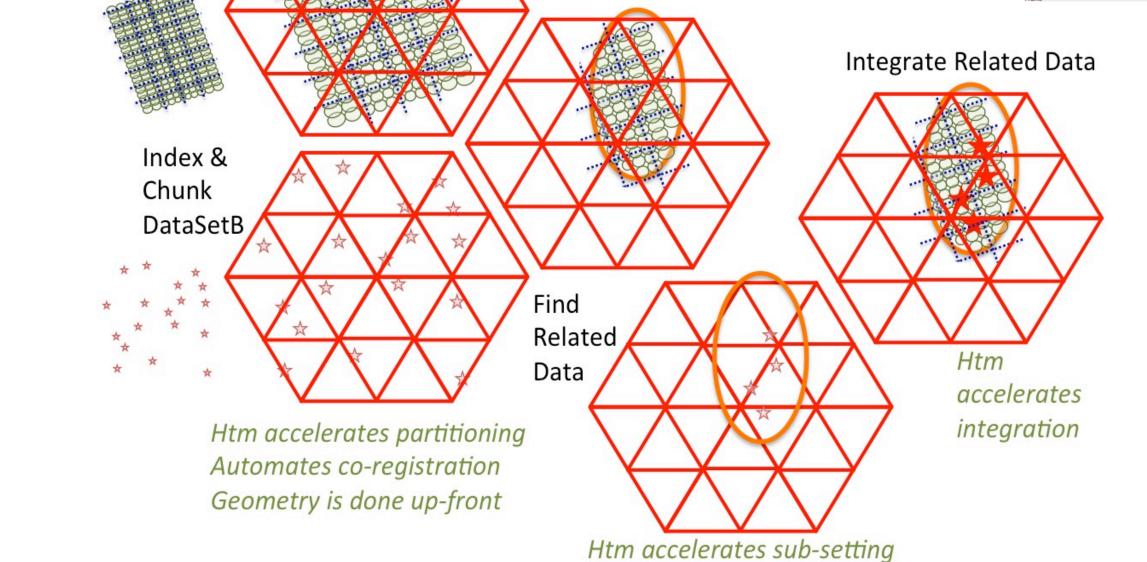
Michael Lee Rilee,¹ Kwo-Sen Kuo,^{2,3} James Frew,⁴ Niklas Griessbaum,⁴ James Gallagher,⁵ and Kodi Neumiller⁵

¹Rilee Systems Technologies LLC, https://orcid.org/0000-0002-5478-7190; ²Bayesics LLC; ³NASA Goddard Space Flight Center; ⁴University of California, Santa Barbara; ⁵OPeNDAP, Inc.

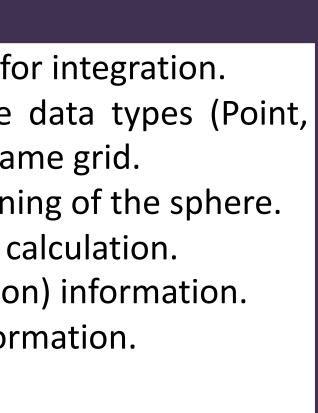
Abstract – Overview of STARE

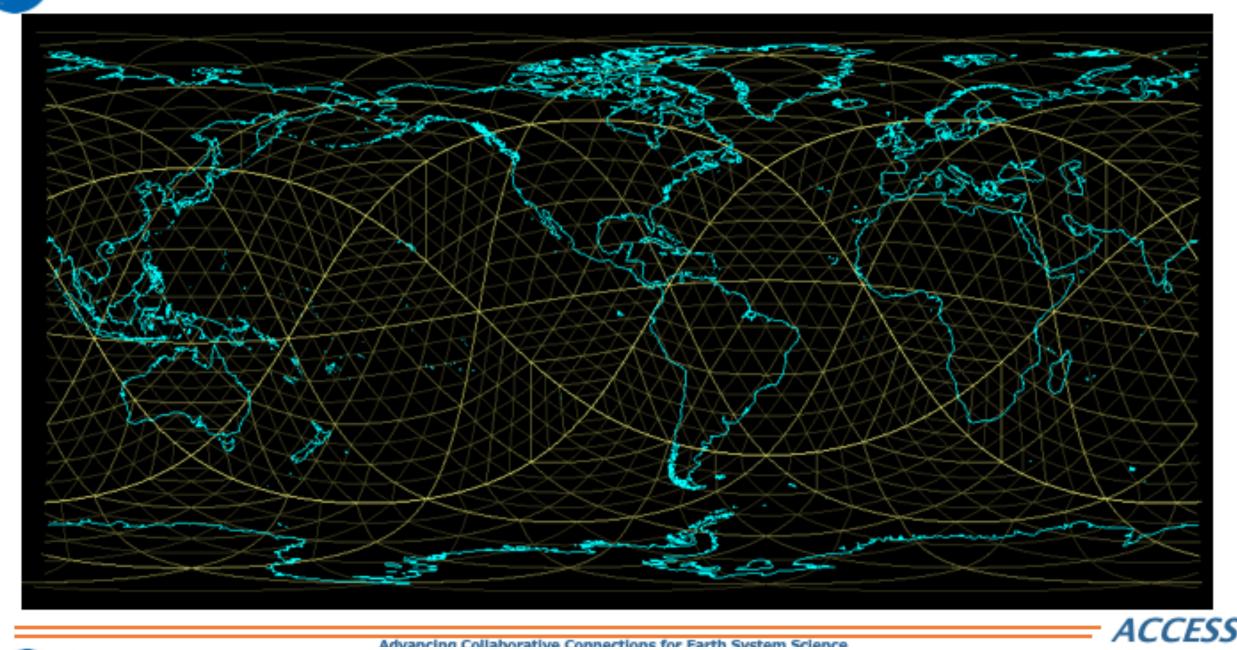
- Data's spatiotemporal nature is a critical organizing principle for integration. Integrative analysis requires gridding or re-gridding diverse data types (Point,
- Grid, Swath, observations and models/simulation) onto the same grid. STARE provides a unifying index based on a recursive partitioning of the sphere.
- STARE's focus is on efficient, scalable indexing and geometric calculation.
- STARE spatial index values contain location and area (resolution) information.
- STARE temporal index values contain time and resolution information.
- STARE's tree-structure aids scale-up and parallelization.
- Open source on GitHub.

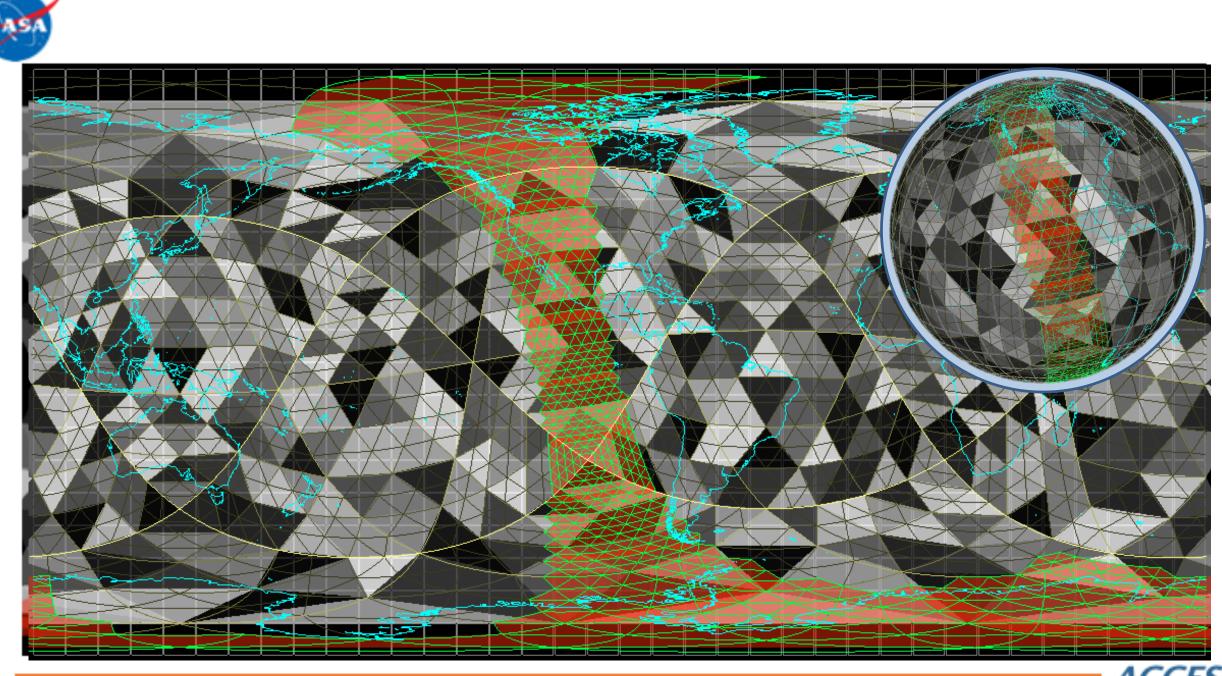




STARE: SpatioTemporal Adaptive Resolution Encoding For Integrative Compatibility Across Variety at Volume







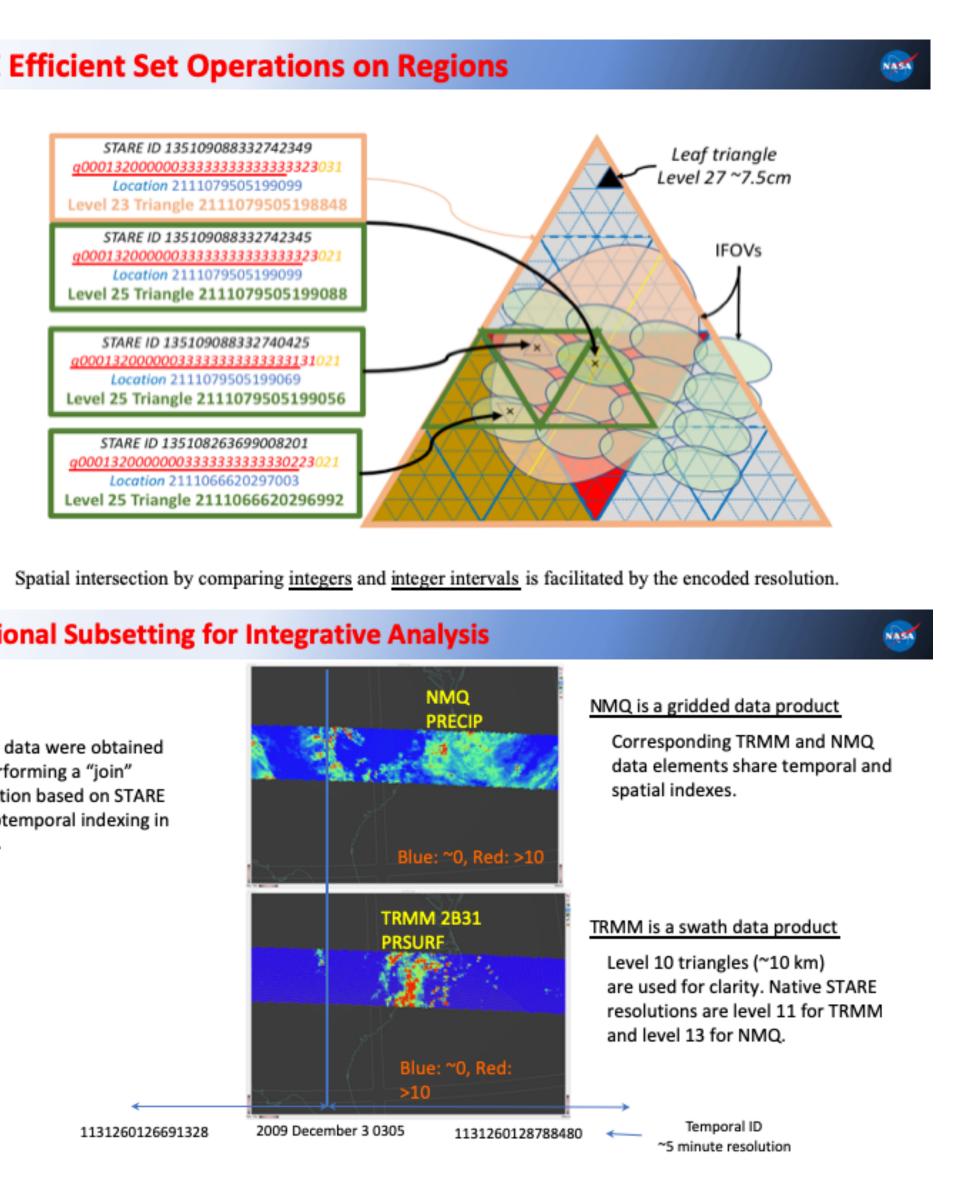
Example Spatial Encoding	Longitude	Latitude		
Human readable	+123.4°	60°		
Single-precision floating-point	0x42f6cccd	0x42700000		
STARE spatial id [*]	0x36e	0x36ee9398f7210f3		
*STARE id also includes resolution to quadfurcation level 20 i.e. ≤ 1		· •		

STARE Efficient Set Operations on Regions

STARE ID 135109088332742349	
q000132000000333333333333333333333333333	
Location 2111079505199099	
Level 23 Triangle 2111079505198848	
STARE ID 135109088332742345	
q00013200000033333333333333333323021	
Location 2111079505199099	
Level 25 Triangle 2111079505199088	
STARE ID 135109088332740425	
q000132000000333333333333333333333333333	
Location 2111079505199069	
Level 25 Triangle 2111079505199056	
STARE ID 135108263699008201	
<u>q000132000000033333333333322</u> 23021	
Location 2111066620297003	
Level 25 Triangle 2111066620296992	$\wedge \times \times$
	- V V

Conditional Subsetting for Integrative Analysis

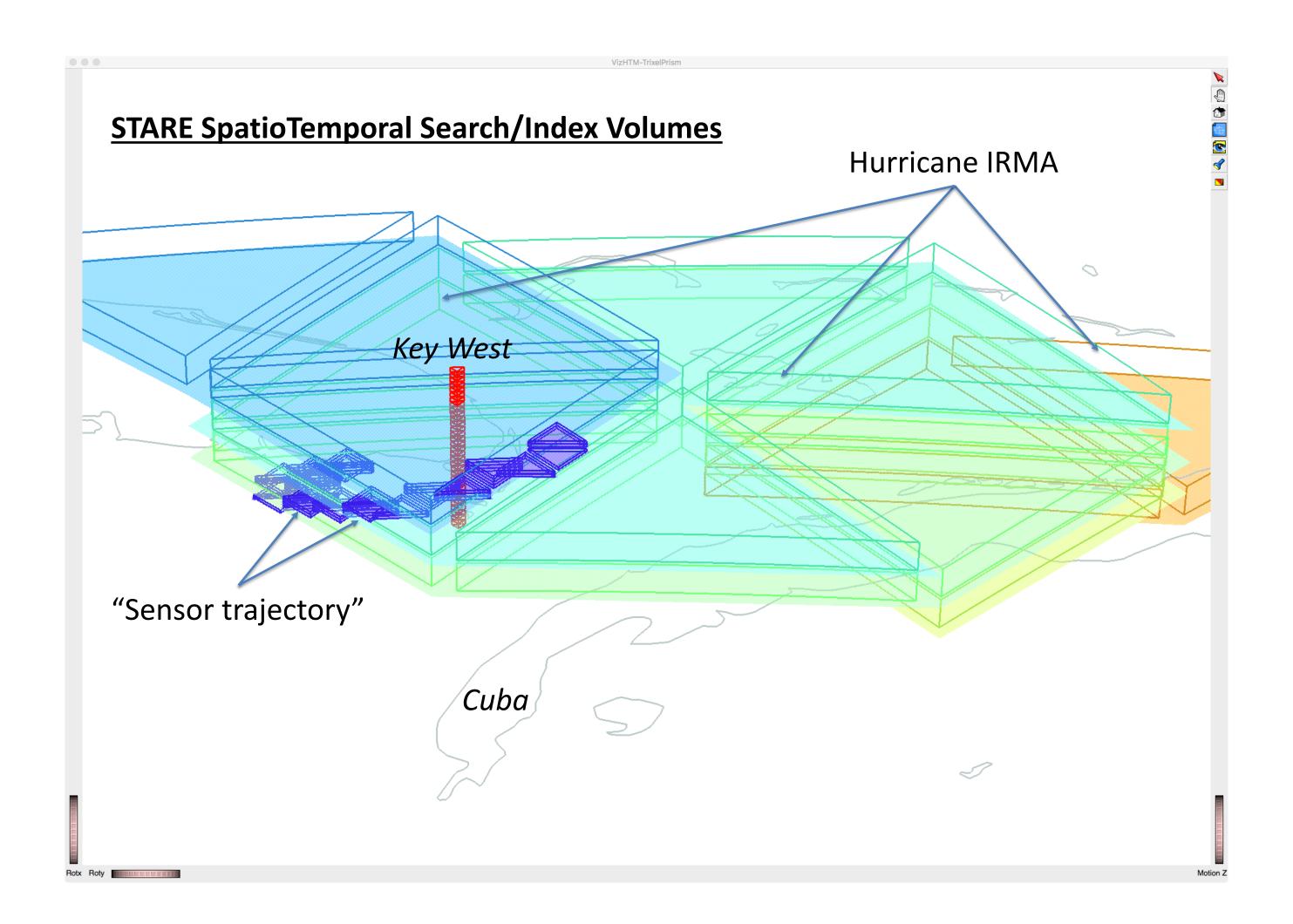
These data were obtained by performing a "join" operation based on STARE spatiotemporal indexing in SciDB.



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Advancing Collaborative Connections for Earth System Science

ACCESS



New Temporal Indexing

- IAU/SOFA for proper treatment of calendar and timing
- Includes time & resolution information
- Resolution treatment improved
- Multiple time encodings/scales pos
- Hierarchy aids chunking/paralleliza

Summary – STARE Upda
New Simplified API
Spatial indexing improve
More rob
Root octa
New Temporal Indexing
New Python interface
Preliminary steps to add
Next steps –
🛠 Build out
OPeNDAF
🛠 Work wit

Collaborators

We gratefully acknowledge the interest and input of R. Wolfe, NASA/GSFC, J. Currey and J. Walter, NASA/LaRC, and the GIOVANNI team.

Acknowledgements

Funding for this research is provided by NASA Advancing Collaborative Connections for Earth System Science (ACCESS) Program, Grant No. 80NSSC18M0118. The opinions expressed herein are those of the authors and do not necessarily reflect the views of NASA.

	Hierarchical Calendrical Encoding, HCE — an example—					
f	Field Name	Field ID	width	start	end	
-	Scale Indicator	0	2	0	1	
nation	Resolution indicator	1	6	2	7	
	millisecond	2	10	8	17	
	second	3	6	18	23	
ossible zation	Minute	4	6	24	29	
	Hour	5	5	30	34	
	Day of week	6	3	35	37	
	Week of month	7	2	38	39	
	Month of year	8	4	40	43	
	Year	9	19	44	62	
	Before/After epoch start	10	1	N/A	N/A	

oust and precise (~7.5cm) agon tilted & tweaked for disambiguation (HCE) drawing on astronomical standards

STARE to OPeNDAP Hyrax

functionality, esp. set logic & regions P integration ch partners & community for tech. infusion